



ISCC 204 Mass balance calculation methodology

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1 Introduction

This document describes the mass balance calculation methodology for physical segregation and mass balance based on the framework conditions laid down in document ISCC 203 „Requirements for traceability“.

2 Scope

This document describes the basic elements which have to be considered for the mass balance calculation:

- (1) Farm/plantation (cultivation of sustainable biomass)
- (2) First gathering point (warehouses or traders which source (buy) sustainable biomass from a variety of farms or plantations and sell sustainable biomass to customers)
- (3) Conversion of sustainable biomass (conversion of sustainable biomass or bioliquids, e.g. oil mill, ethanol plant, biodiesel plant, refinery)
- (4) Warehouse (Storage of sustainable biomass on demand of the first gathering point, i.e. the warehouse has to be located in the supply chain before the first gathering point and shall not buy biomass from farms and sell it to customers)
- (5) Trader/warehouse (Storage and/or trade of sustainable biomass, bioliquids or biofuels after the first gathering point)
- (6) Transport of sustainable products (e.g. with truck, train, barge or vessel)

3 Normative references

As a basic principle, all relevant ISCC documents are valid for the scope. The normative references display the documents whose contents are linked and have to be considered as conjoint points.

Relevant references:

ISCC	201	System Basics
ISCC	203	Requirements for Traceability
ISCC	205	GHG Emission Calculation Methodology and GHG Audit

4 Mass balance calculation methodology

4.1 General requirements

The mass balance system means (According to Article 18(1) of the Renewable Energy Directive (2009/28/EC)) a system in which 'sustainability characteristics' remain assigned to 'consignments'. Sustainability characteristics include the evidence that a product is sustainable, the recognised voluntary scheme, a description of the raw material or product, related Green House Gas (GHG) emissions and the country of origin of the feedstock. Traceability and evidence on the sustainability characteristics and the sustainability of a product will be achieved via delivery notes with respective traceability attributes (s.a. ISCC 203 Requirements for traceability) and the corresponding mass balance system. This assures that origin, quantity, kind of product and related greenhouse gas (GHG) emissions can be uniquely identified and that the amount which has been withdrawn at the respective stage of the supply chain does not exceed the amount supplied.

When consignments with different or no sustainability characteristics are mixed, the separate sizes and sustainability characteristics of each consignment remain assigned to the mixture, e.g. if the characteristics include different figures on GHG emissions they remain separate; these figures cannot be averaged for the purpose of showing compliance with the sustainability requirements. On the other hand, if consignments with the same sustainability characteristics are mixed only the size of the consignment is adjusted accordingly. Sustainability characteristics are likely to be the same where the same feedstock is used and use is made of 'default values' or 'regional actual values'. If raw material or product are processed or losses are involved, appropriate conversion factors should be used to adjust the size of a consignment accordingly.

If a mixture is split up, any consignment taken out of it can be assigned any of the sets of sustainability characteristics. This means that when a sustainability characteristic would be the description of the feedstock, e.g. rapeseed, this characteristic can be different from what the consignment physically contains, e.g. a mix of rapeseed and sunflower oil (accompanied with sizes) as long as the combination of all consignments taken out of the mixture has the same sizes for each of the sets of sustainability characteristics that were in the mixture. A mixture can have any form where consignments would normally be in contact, such as in a container, processing or logistical facility or site (defined as a geographical location with precise boundaries within which products can be mixed).

As within the processing industry the term batch is commonly used for a specific amount of material with the same properties we will use in the following the term 'batch' instead of 'consignment'.

The balance in the system can be continuous in time, in which case a deficit, i.e. that at any point in time more sustainable material has been withdrawn than has been added, is required not to occur. Alternatively the balance could be achieved over an appropriate period of time and regularly verified.

4.1.1 Basic methods of mass balance calculation

With respect to the above requirements and the framework conditions outlined in document ISCC 203 „Requirements for traceability“ the following systems can be distinguished:

(1) Physical segregation

- a. Segregation of all batches with different origin and properties (Identity preservation or hard IP)
- b. Segregation of sustainable and non sustainable products (Soft IP or bulk commodity)

(2) Mass balance

- a. Physical mixing and documentation of quantity credits

4.1.2 Provision of conversion factors

Within the mass balance calculation conversion factors have to be provided for all elements of the production and distribution chain, whose company internal processes include conversion/processing or losses. This has to be applied both for physical segregation and mixing. When using disaggregated default values for calculation, the corresponding conversion factors have to be taken from EU publications or those of its relevant member states. Within individual GHG calculations the conversion factor has to be taken either as an average value of the actual process yield for one period or a shorter time frame from the reporting of the actual yields. The conversion factor for a certain period is defined as follows:

$$C (\%) = A_o/A_i * 100$$

C: Conversion factor

A_i: Amount of the process input material

A_o: Amount of output yielded by the internal process based on input M_i

Under the framework of the mass balance calculation of conversion processes the amount of sold or withdrawn sustainable products within one period should not be larger than the product of the amount A_i going into the process times the conversion factor C.

4.1.3 Greenhouse gas calculation (GHG)

4.1.3.1 Inclusion of GHG values for transport

The requirements for calculating GHG emissions of relevant elements of the production and distribution chain and for transport are documented in ISCC 205 „Calculation methodology for GHG emissions and GHG-Audit”.

Accordingly, the recipient of a batch of sustainable product, has to add the GHG value for transport e_{td} to the GHG value of the incoming product as stated in the delivery note unless the disaggregated default value for transport from Annex V RED 2009/28/EC has been used:

$$E = e_{\text{delivery note}} + e_{\text{td}}$$

E: GHG value, as captured as input value by the mass balance calculation.

e_{delivery note}: GHG value of the incoming product, as stated in the delivery note

e_{td} : GHG value for transport of the incoming sustainable product

4.2 Physical segregation

4.2.1 General requirements for physical segregation

Organizations applying physical segregation shall ensure that the sustainable raw material or product is separated from other products at all stages of the production or distribution process.

Organizations whose sustainable product is not mixed with other products and/or where the sustainable product can be identified as being sustainable during the whole process should use the physical segregation as the preferred option.

4.2.2 Physical segregation of batches

Batches have to be identifiable throughout the entire production and distribution process. This can be achieved by:

- (1) Physical segregation of the production, storage and transport equipment (parallel process)
- (2) Physical segregation by periodical separation (sequential process)

4.2.2.1 Physical segregation of all batches

By using this option all batches with different sustainability characteristics shall be segregated from each other. This applies as well for the segregation of batches of sustainable from non sustainable products as for batches of sustainable products with different origin and different sustainability characteristics (compare with following figure).

Bookkeeping of the batches is identical with the physical status (see also figure 1 where for simplicity reasons a conversion factor of one is applied ($C=1$)), i.e. batches 123, 124 and 125 are segregated physically and via bookkeeping.

Physical segregation of all batches could be applied if batches 123 and 124 have totally different sustainability characteristics or the same sustainability characteristics apart from one. The sustainability characteristics of the incoming batch are documented on the delivery notes (see ISCC 203 Requirements for traceability). Characteristics include for example the kind of product, the country of origin, the GHG emissions value (see also figure 2).

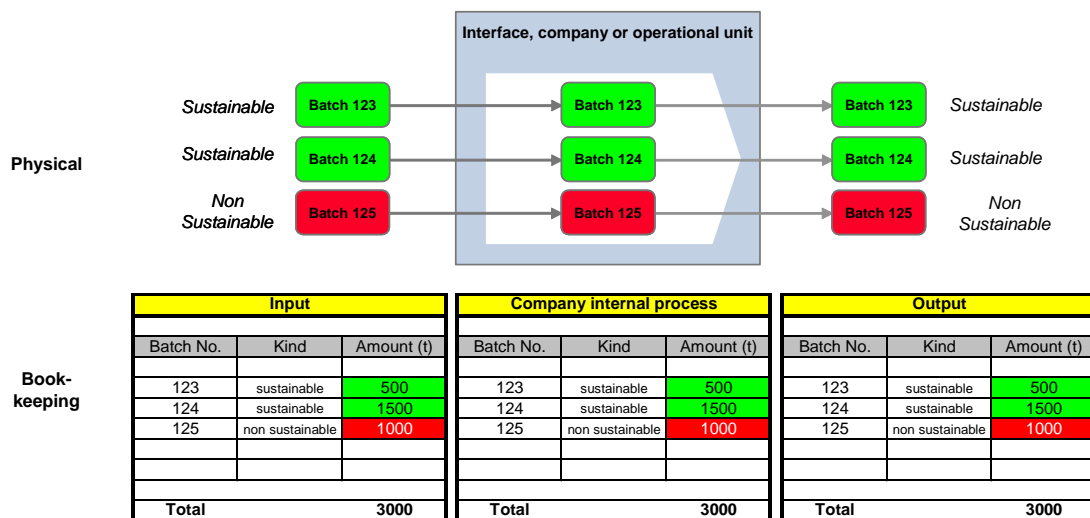


Figure 1: Physical segregation of all batches (C=1)

Within the illustrative example of figure 2 the sustainability characteristics of the incoming batches are the same apart the GHG value. For incoming batch 123 the default value is applied while for batch 124 the individually calculated GHG value is used (for illustrative purposes). Details regarding delivery notes and their information content can be found in ISCC 203.

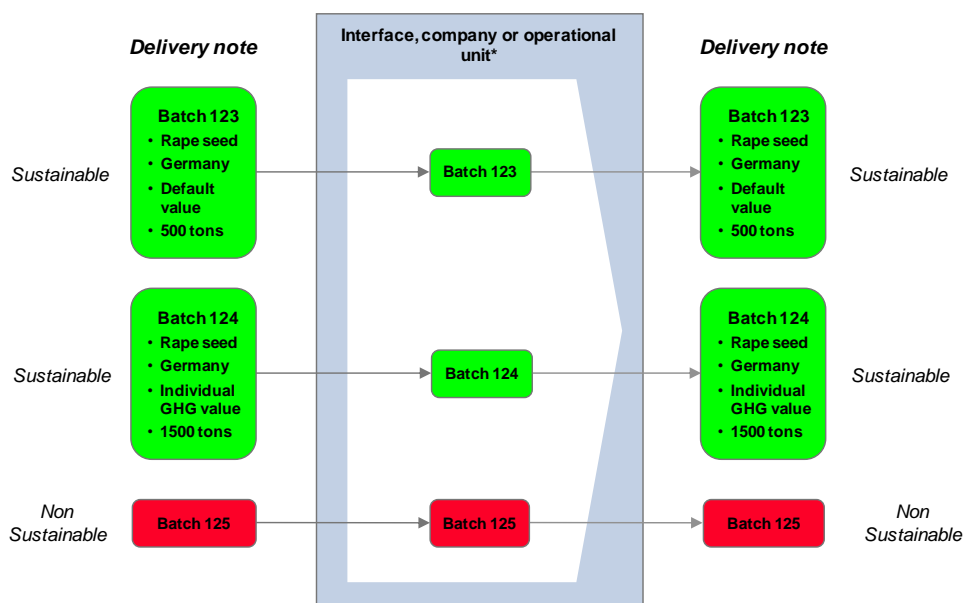


Figure 2: Assigning sustainability characteristics to outgoing batches via delivery notes

With respect to the balance of the system at no point in time more sustainable material can be withdrawn than equivalent material has been added, e.g. the outgoing batch 123 shall not exceed 500 tons in case of the conversion factor being 1. The outgoing batches could be split into sub-batches with different quantities as long as the sum of all sub-batches does not exceed the total quantity (e.g. outgoing batch 123 could be split into 3 sub-batches of 100, 150 and 250 tons with the same sustainability characteristics).

4.2.2.2 Physical segregation of sustainable and non sustainable batches

Within this option only batches of sustainable products are segregated from non sustainable products (see figure 3). Batches of sustainable products can be physically mixed even if sustainability characteristics may be different.

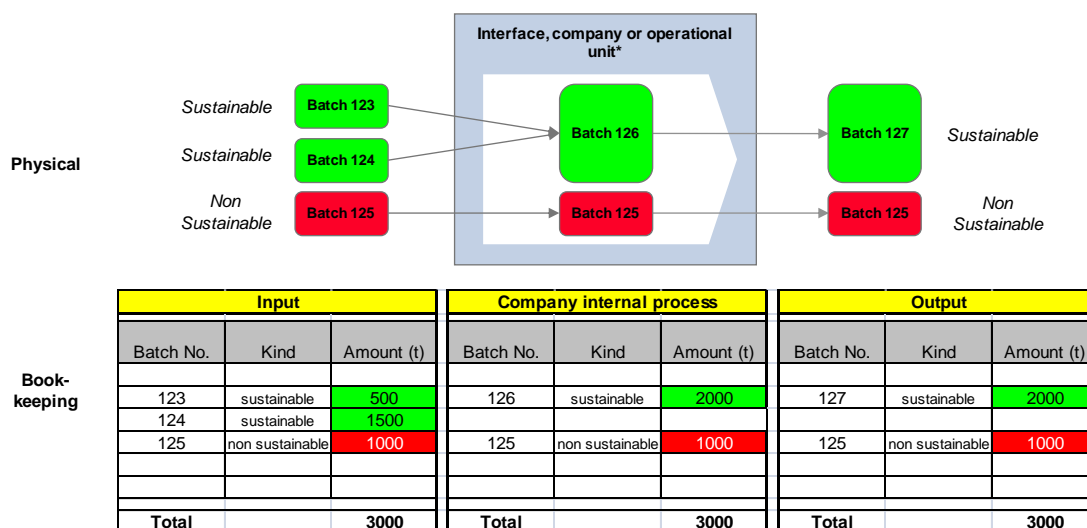


Figure 3: Physical segregation of sustainable and non sustainable batches (C=1)

Although batches with different sustainability characteristics can be mixed physically, looking at batch 127 of figure 3 (bookkeeping) one may expect that the ingoing batches 123 and 124 should have the same sustainability characteristics. Looking at the illustrative example of figure 4 this is true apart from the country of origin, which is UK and Germany. It is possible to declare different countries of origin under one delivery note if the declaration is related to bioliquids ('sustainability characteristics would have to include the information on the country of origin of the feedstock, except for bioliquids (cf. Article 7a (1)(a) of the Fuel Quality Directive)').

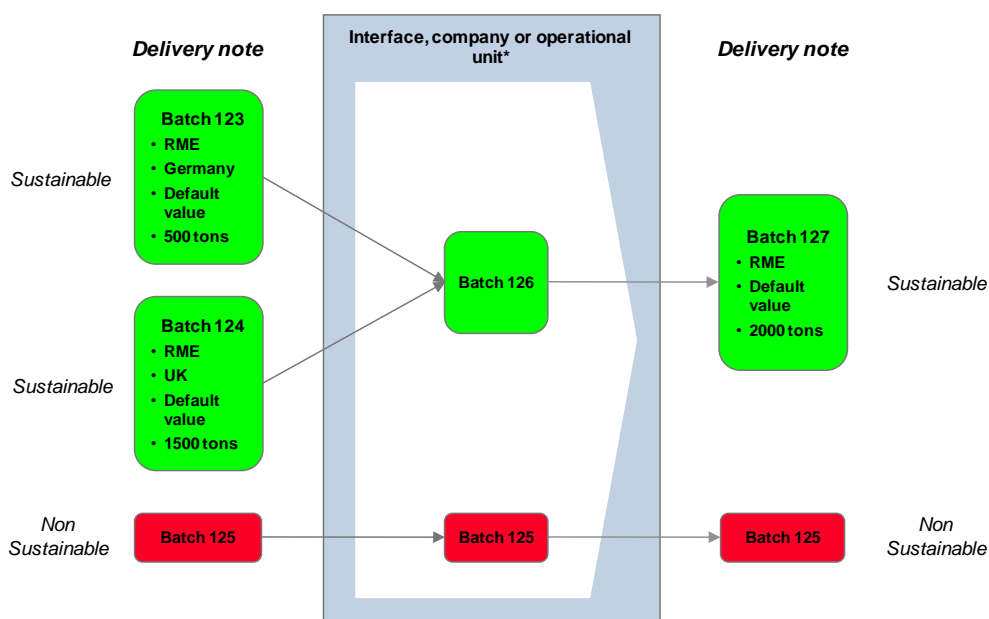


Figure 4: Assigning sustainability characteristics to outgoing batches via delivery notes (C=1)

If batches 123 and 124 would have different GHG emission values then the delivery notes of the outgoing batches have to carry the same sustainability characteristics as batch 123 and 124 and could not exceed the quantity of 500 respectively 1500 tons of Rape Methyl Ester (RME) in figure 5.

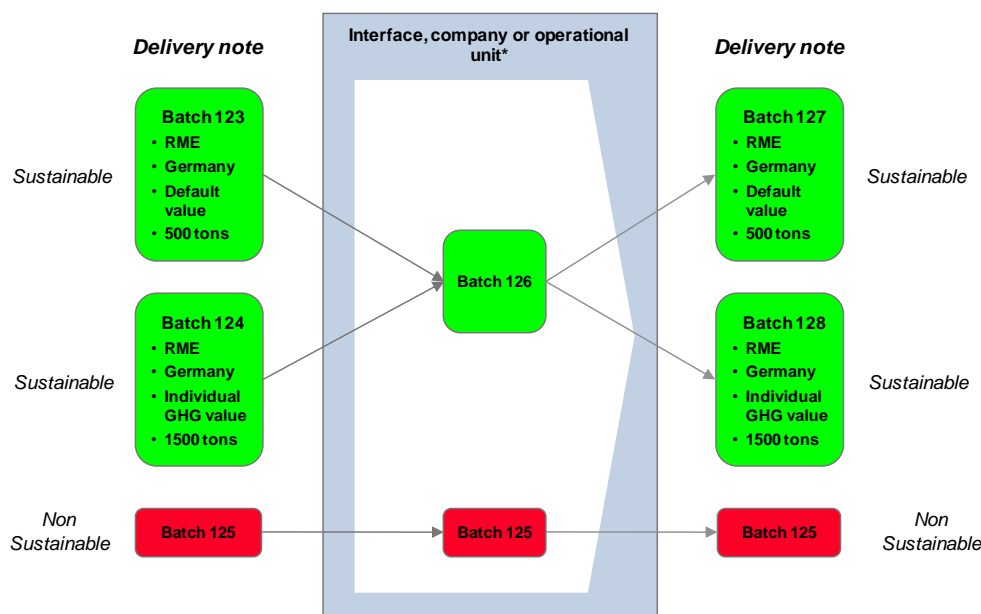


Figure 5: Assigning sustainability characteristics to outgoing batches via delivery notes (C=1)

With respect to the balance of the system at no point in time more sustainable material can be withdrawn than equivalent material has been added, e.g. the outgoing batch 127 in figure 5 shall not exceed 500 tons assuming a conversion factor of 1. The outgoing batches could be split into sub-batches with different quantities as long as the sum of all sub-batches does not exceed the total quantity (e.g. outgoing batch 127 of figure 5 could be split into 3 sub-batches of 100, 150 and 250 tons with the same sustainability characteristics).

Within the bookkeeping sustainable batches with different GHG values cannot be aggregated. If two or more incoming batches have different GHG input values, the highest GHG emission value (of the least performing batch) could also be used consistently for the entire input if other sustainability characteristics are identical, i.e. aggregation is allowed if all batches use the GHG value of the least performing batch. If in figure 5 the individual GHG emissions value of batch 124 is lower than the default value of batch 123 than the default value of batch 123 could be used consistently for all incoming batches (as the other sustainability characteristics are the same).

4.3 Mass balance

Mass balance methodology allows the mixing of batches of sustainable and non sustainable products at every stage of the supply chain. Due to physical mixing the mixture loses its individual properties. The sustainability characteristics of products can therefore only be determined via bookkeeping. This requires calculation of the mass balance and verification of the mass balance calculation with respect to the chosen period for balancing.

4.3.1 Definition of the timeframe for balancing (period)

The mass balance calculation requires the definition of the timeframe for which the outgoing batches have to be balanced with the incoming batches. The maximum timeframe (period) for the mass balance calculation is three months. Participants in the ISCC scheme may choose a period less than three months, e.g. one month. Therefore the mass balance calculation for relevant elements of the supply chain must be balanced within the period for both incoming and outgoing sustainable products according to the RED.

If within one period more sustainable product has been received (including inventory of sustainable product) than dispatched, the surplus of sustainable product is defined as positive credit. The transfer of positive credits from one period to the other is only possible if the credit transfer is covered by the equivalent quantity of physical biomass, bioliquid or biofuel (i.e. it is not possible to carry over more positive credits into the next period than the quantity which is physically in stock at the end of the period).

The rationale for the maximum period to be three month is twofold:

- A shorter mass balance calculation period does not offer additional security against fraud
- Reducing the period to much shorter timeframes will increase cost and investment significantly as well as reduce flexibility for the market players without improving security and sustainability within the supply chain

4.3.2 Quantity credit methodology

Batches of sustainable (may have different sustainability characteristics) and non sustainable products can be physically mixed within a company internal process (see figure 6). Within the period, batches of sustainable products with the same sustainability characteristics can be arbitrarily split within the bookkeeping as long as the total amount does not exceed the quantity credit

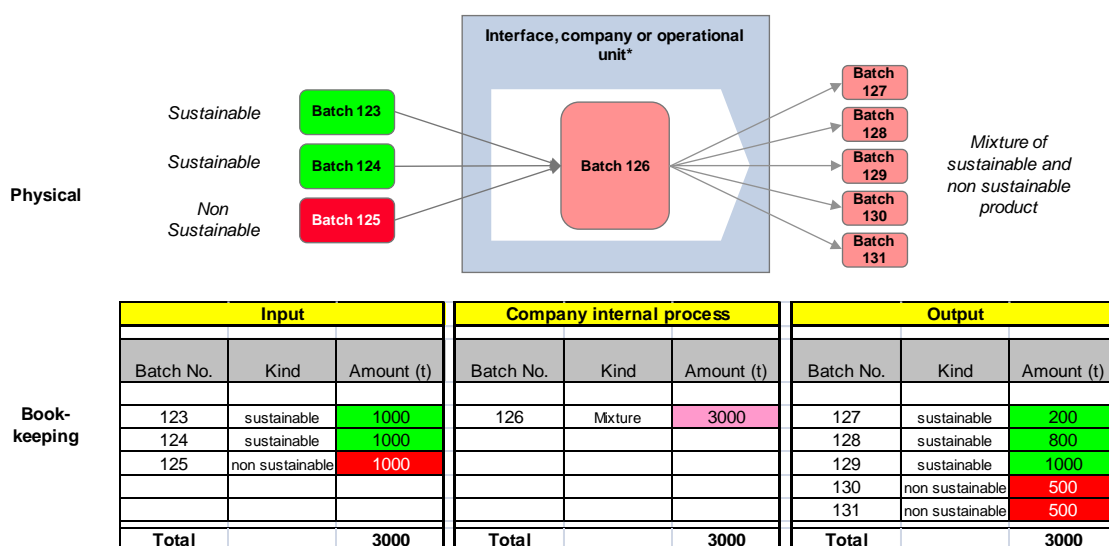


Figure 6: Quantity credit methodology (C=1)

Within the bookkeeping of the figure 6 batches 130 and 131 (which physically are a mixture of the sustainable and non sustainable incoming batches) will be declared as non sustain-

able. The outgoing batches 127, 128 and 129 are declared sustainable. An illustrative example on how the different sustainability characteristics (in this example only GHG values) are assigned to outgoing batches via delivery notes is given in figure 7. For details regarding the assignment of sustainability characteristics to delivery notes see ISCC 203 Requirements for traceability.

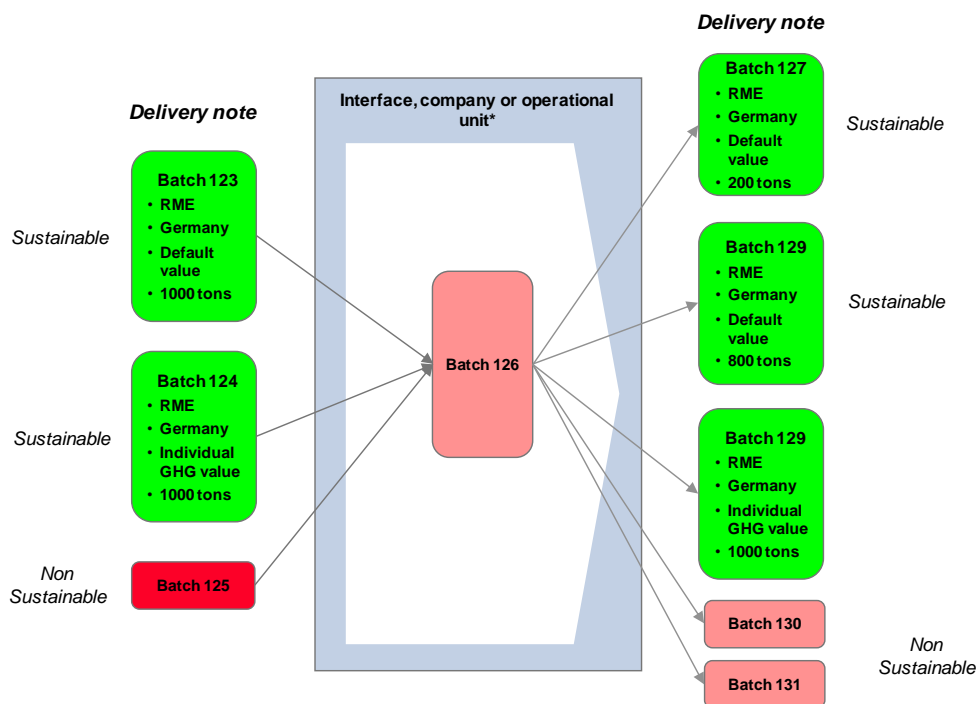


Figure 7: Assigning sustainability characteristics to outgoing batches via delivery notes (C=1)

Within the bookkeeping sustainable batches with different GHG values cannot be aggregated. If two or more incoming batches have different GHG input values, the highest GHG emission value (of the least performing batch) could also be used consistently for the entire input if other sustainability characteristics are identical, i.e. aggregation is allowed if all batches use the GHG value of the least performing batch. If in figure 7 the individual GHG emissions value of batch 124 is lower than the default value of batch 123 than the default value of batch 123 could be used consistently for all incoming batches (as the other sustainability characteristics are the same).

4.3.3 Mixture

Mixture in the context of mass balance calculation is normally a mixture of sustainable and non sustainable products (biomass, bioliquids or biofuels) of the same crop origin. For the mass balance calculation, the definition of the periodical and spatial boundary is of crucial importance. The periodical boundary defines the timeframe for which the mass balance is calculated and the output of sustainable biomass product does not exceed the input. The spatial boundary defines for which spatial entity the mass balance must be applied.

The maximum periodical boundary is three months and the spatial boundary is defined as the site of an operation, processing or logistical facility with the site being the geographical location with precise boundaries within which products can be mixed.